Periodical AR

AMERICAN JOURNAL OF PHARMACY

and

THE SCIENCES SUPPORTING PUBLIC HEALTH

PUBLIC LIBRARY
OCT 22 1941
DETROIT

SINCE
1825

JOSIAH C. PEACOCK
Honorary President of the American Pharmaceutical Association

SEPTEMBER
1941

"THE SHAPE OF THINGS TO COME"

—is again being determined in the seething cauldron of another world war, and the turn of events will have their effect upon each and every one of us, no matter who we are or where we are. Just what part we, as individuals, can take in influencing these world readjustments, is somewhat indeterminate.

But, it depends upon a decision that every recent high school graduate can and should make for himself at this time just what the next four years will mean to him personally, and the bearing they will have upon the balance of his life. Will he, in 1946, have completed his college education and prepared himself for his life work or will he have sold that birthright, outright, just to make large earnings during a brief period of national industrial prosperity?

Mindful of this decision-to-be-made, may we point out that now, as never before, training in applied science enables one to enter upon those avenues of achievement that are always open to those who are prepared and inspired. Further, may we state that the only means of access to such careers is through formal education at an institution of higher learning, and preferably in a curriculum primarily devoted to the teaching of science.

The Philadelphia College of Pharmacy and Science is just such an institution. In fact, it is the oldest college of its type in the Americas, having been founded in 1821 to provide systematic instruction in pharmacy, and having advanced, in these 120 years, to the position of offering accredited undergraduate curricula not only in pharmacy but in chemistry, in bacteriology and in biology. Graduate studies are available, too, in pharmacy, in pharmaceutical chemistry, in bacteriology and in biology.

For details, write for Catalog J.

Philadelphia
College of Pharmacy and Science

43rd Street, Kingsessing and Woodland Avenues

PHILADELPHIA PENNSYLVANIA

AMERICAN JOURNAL OF PHARMACY

AND THE SCIENCES SUPPORTING PUBLIC HEALTH

Since 1825

LINWOOD F. TICE, Ph. G., B. Sc., M. Sc., Editor
John E. Kramer, B. Sc., Business Manager

COMMITTEE ON PUBLICATION

E. Fullerton Cook, P. D., Ph. M., M. S., Chairman
Mitchell Bernstein, P. D., M. D., F. A. C. P. Louis Gershenfeld, P. D., Ph. M., D. Sc.
Joseph W. E. Harrisson, P. D., Ph. M. John K. Thum, Ph. G., Ph. M.
J. W. Sturmer, Phar. D., Ph. M., D. Sc., Secretary
Ivor Griffith, P. D., Ph. M., D. Sc., F. R. S. A., ex officio

Vol. 113. SEPTEMBER, 1941 No. 9

CONTENTS

Our Cover:

Josiah C. Peacock 348

Editorials:

Pharmacy's Ambassador at Large—The Hospital Pharmacist 349

Ships, Shoes and Sealing Wax 351

Articles:

The Effect of Undiluted Antiseptics on Tissue Fragments. By Bernard Witlin 353

The Electron Microscope. By George Rosengarten 358

No Worms in Mine, Please. By T. Swann Harding 364

Abstracts of Papers Selected From Those Presented Before the Scientific Section of the American Pharmaceutical Association at Its Annual Convention in Detroit, August 16-23, 1941 371

Solid Extracts 379

Book Reviews 381

Our Contributors This Month 382

Published monthly by the Philadelphia College of Pharmacy and Science
43rd Street, Kingsessing and Woodland Avenues, Philadelphia, Pa.

Annual Subscription, $3.00 Foreign Postage, 25 Cents Extra
Single Numbers, 30 Cents Back Numbers, 50 Cents

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa.,
Under the Act of March 3, 1879

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103
Act of October 3, 1917. Authorized February 15, 1920

OUR COVER

JOSIAH C. PEACOCK

JOSIAH COMEGYS PEACOCK was born at Millington, Md., August 24, 1869. He entered the field of pharmacy as an apprentice in 1885 and three years later he matriculated at the Philadelphia College of Pharmacy where he graduated in 1891. Following his graduation he pursued further study in chemistry.

In 1892 he entered the employ of Parke, Davis & Co. but he was invited soon after to join the teaching staff of the Philadelphia College of Pharmacy under Professor Trimble whom he succeeded following the latter's death. The call of retail practice lead Mr. Peacock to relinquish teaching and he conducted a highly successful store for a period of almost twenty years. In 1900 he married Bertha L. DeGraffe who also was a graduate in pharmacy and chemistry, having parallel interests in the field of pharmacy. Together they published a number of scientific papers dealing with plant principles and pharmaceutical problems.

In 1922 Mr. Peacock became connected with the H. K. Mulford Co. with which he was associated as director of the detail staff until his retirement from active service in 1929.

Mr. Peacock has served organized pharmacy, both state and national, with praiseworthy effort. His loyalty to his alma mater has been sincere and helpful. This Journal is indeed happy that the American Pharmaceutical Association has added still another to the long list of honors bestowed upon him in selecting him as their honorary president.

GUEST EDITORIALS

PHARMACY'S AMBASSADOR AT LARGE—THE HOSPITAL PHARMACIST

We are happy this month to welcome back to the editorial page, the ever popular writings of our former editor.

I PRESUME that it might be a courtesy to my readers to state that I have a very belonging right to write with some measure of authority concerning hospital pharmacy. That right is mine by virtue of the fact that I had the privilege for some ten odd years of conducting a hospital pharmacy. Admittedly it was a small hospital, of only a hundred beds, but with quite a large industrial out-patient department, and I can state with more fact than conceit that I found it relatively easy in a short period of time to make the drug room of that little institution the center of gravity of the scientific area of the establishment. And I mean center of gravity—not center of levity.

The staff of the institution, which incidentally was rated as a Class A hospital by the American College of Surgeons, constituted a group of fifty-six physicians and surgeons, and would have yielded a cross-section of attributes and qualifications much like that of many American hospitals of the same size, and in the same kind of a locality. I soon got to know, and purposefully so, those staff doctors whose dignity was in inverse ratio to their doctoring abilities, and also those whom I knew would willingly accept any worthwhile service that the pharmacy might contribute. The latter group I cultivated assiduously —the former group even more assiduously.

It became apparent to one very soon, as it must become apparent to every hospital pharmacist who really loves the challenges of his job, that I was in a fallow field and I revelled in it.

Internes, whose training in prescription writing focused mostly around printed manuals, nurses who thought that one-half of a fortieth was a twentieth, and a major staff that was severally quite willing to cooperate in the interest of results and convenience, left nothing to be desired in the way of promoting real pharmacy. Not every

hospital pharmacist entering upon a new assignment in this day and age finds a field so ripe for exploitation and improvement.

I had the advantage of succeeding a pharmacist who had made no particular effort to do else than fulfill the minimum requirements of his job—and you may believe it or not—there are still such so-called pharmacists cloying and clogging the drug departments of many otherwise worthwhile hospitals, and they constitute an internal and eternal disgrace to their profession and to the management that suffers their presence.

For there is no phase of the practice of pharmacy that offers a better exercise for professional service and for spreading the gospel of real pharmacy than does Hospital Pharmacy.

This brief editorial is captioned "Pharmacy's Ambassador at Large—the Hospital Pharmacist" for that very reason. The well-trained, assiduously energetic and enterprising hospital pharmacist is one of the most valuable members of any hospital staff and his good influence upon internes, nurses, and staff physicians and surgeons may be made to diffuse far beyond the institutional precincts.

Why, do you suppose, have the manufacturing houses come to cultivate, in the past decade more than ever, the interest and friendship of the hospital pharmacist? The answer, of course, is because they have found it profitable and worthwhile. Well do they know that through his agency their products may find a field of use, not just within the hospital's walls, but in the wide daily outside practice of every doctor on the staff.

Mind you, this is not in any sense a criticism of the manufacturing houses. Rather is it a compliment to their perspicacity and to their acumen.

But it does involve at the same time a real challenge to the hospital pharmacist. I should like to have the privilege of appointing a well remunerated, well trained, and lastingly enthusiastic pharmacy-conscious pharmacist to every hospital in the United States. Within a decade of that event, the complexion of pharmacy, the appreciation of pharmacy in this country, would improve a hundred-fold.

I am not suggesting that there are not scores of such worthwhile persons now engaged in worthwhile hospital pharmacy practice, but I am suggesting that there are a great many such who are not conscious of their responsibilities, of their opportunities, and of their real ambassadorship in pharmacy. The enterprising hospital pharmacist should be a member of the major hospital staff, attending the staff

conferences and participating in them. He should be an important member of the nurses' training school staff, and, even more importantly, he should be the director, in his own way, of a certain post-graduate instruction to the interne corps, for if any group really needs down-to-earth instruction in the fundamentals of materia medica and practical pharmacy it is these aerated and fluffy fellows, the recent-omniscient graduates of medical schools whose useful deflation should be the particular delight and desideratum of the dictator of the drug room.

This bit of writing was not meant in any way to outline specific features of hospital pharmacist practice. I have done all I intended to attempt to do, namely, to call insistent attention to the great opportunities for professional services of high caliber that wait for the prepared and inspired hospital pharmacy—and to almost beseech none to enter this challenging field except those who do so with the great awareness, namely, the awareness that the Hospital Pharmacist of today is in every sense and nuance of the statement, *"Pharmacy's Ambassador at Large."*

IVOR GRIFFITH.

SHIPS, SHOES AND SEALING WAX

RECENTLY, at a state pharmaceutical convention, a well known figure in national pharmacy stated rather bluntly that he was not at all concerned about the diversity of merchandise sold in some drug stores today. To his credit he added the proviso that they should be sold honestly, but, according to the speaker's own words, "It would not bother him one whit if a druggist sold a tractor." "That is, if a druggist *could* sell a tractor."

So, it has come to the point where pharmacists now may sell anything, from ships and shoes to sealing wax, with official sanction

from the men in high places. Many retail pharmacists have been doing just that, for years, some of them trading in obscure and obtuse articles to the complete subjugation of basic pharmaceutical wares, yet they continue to parade under the drug store banner.

It has been these men, taking undue advantage of an economic era that has witnessed the installation of some side-lines in almost every drug store so that it might be able financially to provide the pharmaceutical service for which it was established, whose actions and whose conduct make it necessary for other practitioners to make excuses, and to try to ameliorate the bad impressions that these men create among the general public as to the rank commercialization of present day pharmacy.

What do pharmacists know about the workings of tractors, or watches, or mechanical dolls? Under what license do druggists take the privilege of selling underwear, objects of art and previously prepared foodstuffs that have no pretense of special nutritional use? Do they feel confident and capable in invading the realms of other specialty merchants?

Yet, if grocers want to sell boxed or bottled vitamin products, or aspirin, or some other simple substance, they are accused of encroaching upon a field requiring four years of college training to enter with proper preparation.

If bandages and bottled antiseptics are offered for sale in the variety store, druggists cry to high heaven to state that these products surely can't be much good to be sold without pharmaceutical supervision.

Let it not be assumed that this Journal favors relaxation of the laws and regulation prohibiting the sale of pharmaceutical items through any but licensed and proper outlets. More power to that bit of sound legislation. But it is strongly of the opinion that pharmacists *should* and *must* stay in their own bailiwick, so to speak, and clean their own houses before they can be justly critical of others outside professional circles who seem to be casting greedy glances at what is rightly and properly the pharmacist's.

JOHN E. KRAMER.

THE EFFECT OF UNDILUTED ANTISEPTICS ON TISSUE FRAGMENTS

The evaluation of antiseptics based on the comparison of concentration required to act as a bactericide with that killing tissue is misleading since the concentration actually employed in practice is not used. The effect of widely used antiseptics on living tissue has been studied and their relative toxicities are reported.

By Bernard Witlin

Department of Bacteriology,
Philadelphia College of Pharmacy and Science.

THERE is a definite need to test antiseptics by methods which more closely approximate the actual conditions of use rather than depending upon procedures by which an *in vitro* laboratory evaluation is employed to give some index of their value. In recent work, attempts have been made to evaluate bactericidal agents by noting their *in vitro* (1, 2) and *in vivo* (3) effects on living tissue and comparing these with their *in vitro* bactericidal efficiencies. These methods (1, 2) take into consideration the toxicity of the bactericidal substances on tissue fragments exposed to different dilutions of the bactericides by varying the dilution and keeping the time constant. The fallacy in interpreting such findings is in attempting to compare various dilutions of different chemicals which will give identical results in a constant time period without considering a variance in the time factor and employing the dilution used in practice. In practical routine, it is necessary to consider the toxicity of the bactericide only in relationship to the strength or concentration of that bactericidal agent as actually used. Any correlation is to be made with such concentrations and not with dilutions which are not necessarily employed in practice.

Purpose

Previous investigations have revealed (1, 2) that organic mercurials appeared toxic to tissue fragments in weaker dilutions than

did the phenols, the silver salts and the halogens. The following experiment was carried out in an attempt to correlate the action of bactericidal agents in relation to their concentrations, as applied in clinical practice by varying the time and keeping the dilution constant, the latter being a concentration recommended for routine use.

Experimental

Employing an aseptic technic throughout, the following tests were performed employing the perfusion method of culturing tissue *in vitro* (2). The heart of a nine-day-old chick embryo was aseptically removed to a sterile pyrex petri dish, rapidly rinsed in Tyrode solution and transferred to another sterile pyrex petri dish. One-half to one millimeter fragments were rapidly cut and covered with 5 cc. of the respective undiluted bactericidal agents. The tissue fragments were then exposed to the medicament for the following periods of time: ¼, ½, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 30, 45, 60, 90 and 120 minutes. All exposures over 10 minutes were maintained in the incubator at 38.5 degrees C.

One fragment of each heart was exposed to Tyrode solution as a control. Controls employing physiological saline (0.85 per cent.), distilled water, Tyrode solution and 70 per cent. alcohol also were tested.

At the end of each time interval, a tissue fragment was removed from the antiseptic, rinsed in Tyrode solution to remove the excess medicament, and transplanted to the side of a wide-mouthed pyrex Erlenmeyer flask (2). The tissue was then perfused with 10 cc. of a Tyrode-5 per cent. tissue extract solution and incubated for 48 hours at 38.5 degrees C. After incubation, the tissue fragment was removed to a cover slip, inverted on a hanging drop slide and examined for proliferation (growth).

Another technic employed as a check was to place the tissue fragment in a Carrel flask, imbed in a plasma clot, allow 1 cc. of undiluted medicament to act for the same time intervals as used above, rinse with Tyrode solution and cover with Tyrode-5 per cent. tissue extract solution (2). The tissue in the Carrel flask was then incubated for 48 hours at 38.5 degrees C. and examined microscopically for proliferation.

The findings in both technics were identical and are recorded in the accompanying table.

RESULTS OBTAINED UPON EXPOSURE OF CHICK-HEART TISSUE-FRAGMENTS TO UNDILUTED ANTISEPTIC SOLUTIONS BY THE PLASMA CLOT[1] AND PERFUSION[2] TECHNICS

Bactericide	Exposure of tissue to Bactericidal Agents in Minutes																	
	¼	½	1	2	3	4	5	6	7	8	9	10	15	30	45	60	90	120
Phenol aqueous 1:20	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexylresorcinol glycerinated 1:1000 (S. T. 37 Solution)	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0
Mercuric Chloride aqueous 1:1000	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0
Mercurophen aqueous 1:1000	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0
Merthiolate aqueous 1:1000	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0	0
Merthiolate tincture 1:1000°	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0	0
Mercresin tincture 1:1000	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0	0
Metaphen aqueous 1:500	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0
Metaphen tincture 1:200	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0	0
Mercurochrome aqueous 1:50°	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	0
Iodine tincture 7% U. S. P. XI	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0
Zonite aqueous 1:2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0
Cargentos aqueous 1:20	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Argyrol aqueous 1:20	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
CONTROLS																		
Tyrode Solution	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Physiological Saline (0.85%)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Distilled Water	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
70% Alcohol	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

+ Proliferation after 48 hours incubation.

0 No proliferation after 48 hours incubation.

° A staining of the tissue by the colored solution was discernible after the period of exposure and the Tyrode rinse. However, after incubation the proliferating tissue regained its natural appearance and the fragments were devoid of the color.

Bactericidal Efficiency

Bactericidal efficiency tests (*in vitro*) were conducted upon the commonly used dilutions of the antiseptics tested, employing as the test organisms: Staphylococcus aureus, Eberthella typhi and Escherichia coli. The F. D. A. Phenol Coefficient technic (4) was employed at 37.5 degrees C. The only difference was in the time intervals for making transplants; time intervals were identical to those employed in the tissue toxicity tests (see preceding table). One standard loopful (4) was removed and transplanted into a tube containing 10 cc. of F. D. A. broth. These were incubated at 37.5 degrees C. for one week and examined for sterility.

The findings revealed all the medicaments (in the concentrations indicated) capable of destroying the Staphylococcus aureus, Eberthella typhi and Escherichia coli within 30 seconds. Transplants were made for bacteriostasis and the findings were negative. The controls of Tyrode solution, physiological saline and distilled water did not kill the organisms after 120 minutes' exposure. The 70 per cent. alcohol control killed Eberthella typhi in 30 seconds and the other two test organisms within 3 minutes.

Discussion

Bactericidal efficiency tests with the commonly used dilutions of the antiseptics tested were capable of destroying one-half cubic centimeter of Eberthella typhi, Staphylococcus aureus or Escherichia coli within thirty seconds after their exposure to 5 cc. of the different medicaments at 37.5 degrees C. All chemicals employed were found to be efficient (*in vitro*) bactericides in the dilutions recommended and commonly employed in clinical procedure.

Tissue experiments revealed that the two phenolic compounds employed, displayed toxicity in shorter periods of time than did the mercurials, the silver salts or Zonite. Tincture of Iodine displayed a toxicity less than and 70 per cent. alcohol the same as phenol. It may be possible to correlate the bactericidal efficiencies and tissue toxicities of these compounds, but such a correlation would not be satisfactory without considering other conditions experienced in clinical practice, i. e., *dilution* by blood, serum, mucus, exudate, etc., *inhibition of penetration* by the formation of metallic albuminates, blood clots, *body absorption* of the medicament, *retention* as in Argyria and mercury poisoning, rapidity of *elimination, incompatability* with proteins and body fluids and other interferences.

These experiments demonstrate the relative tissue toxicity of different bactericidal agents in the concentrations commonly employed by revealing the intensity and rapidity of their action, rather than by noting the relative degree of toxicity obtained (1, 2) from a comparison of the ability of these agents to display toxicity in varying weak dilutions, the latter being concentrations not necessarily employed in practice.

Summary and Conclusion

Undiluted antiseptics in their commonly employed concentrations (or as marketed) were tested on chick-heart tissue-fragments. The plasma-clot and perfusion technics were employed.

Two phenolic antiseptics in concentrations commonly used exhibited toxicity to chick-heart fragments in shorter periods of time than did solutions of six mercurials, two silver salts and two halogens. Tincture of iodine displayed a toxicity less than that displayed by 5 per cent. phenol.

There was a definite ability of tissue or protoplasm to withstand the lethal effects of metallic compounds over a longer period of time than of the phenols.

Bactericidal efficiency tests were conducted employing Eberthella typhi, Staphyloccus aureus and Escherichia coli. The antiseptics employed (in the designated concentrations) were capable of bactericidal action within 30 seconds after exposure to the test organisms.

Controls of Tyrode Solution, Physiological Saline (0.85 per cent.) and Distilled Water did not kill the organisms or display toxicity (inhibit tissue proliferation) after 120 minutes' exposure. Seventy per cent. Alcohol controls were toxic to tissue fragments in the same period of time as was 5 per cent. Phenol, and displayed bactericidal properties, killing Eberthella typhi in 30 seconds and Staphylococcus aureus and Escherichia coli within 3 minutes.

BIBLIOGRAPHY

(1) Salle, A. J., et al., Proc. Soc. Exptl. Biol. & Med. *XXIV*:371 (1936). Complete reference to previous literature found here.

(2) Witlin, B., *Am. J. Pharm. 113*, 203 (1941).

(3) Witlin, B., "Evaluation of Bactericides by An Egg Injection Technic." Paper presented before the Meeting of The American Association for The Advancement of Science, Philadelphia, Pennsylvania, December, 1940.

(4) Circular 198, Food and Drug Administration, United States Department of Agriculture, December, 1931.

ACKNOWLEDGEMENT

The author wishes to express his sincere appreciation to Dr. Louis Gershenfeld for his valuable suggestions in the preparation of this paper.

THE ELECTRON MICROSCOPE

The Electron Microscope has been widely heralded as one of the most important physical tools in the last decade. The following article describes in simple, understandable fashion the principles underlying its construction and operation.

By George Rosengarten

A NEW tool has been placed at the disposal of research workers. The optical microscope usually employed in the laboratory has a magnifying power of about 2000. The Electron Microscope may be used to produce a magnification of 100,000.

Like the radio, television, and the talking motion pictures, the electron microscope is the result of research in many laboratories in different parts of the world. Through the kindness of Dr. V. K. Zworykin, research physicist of the R. C. A. laboratories in Camden, N. J., it was made possible for me to examine at first hand this most useful instrument.

I shall attempt to show how the fundamental principles of the physics of light and electricity, developed through the years, have been combined into one piece of apparatus making visible the most minute details of the tubercle bacilli or the character of the numerous colloidal particles.

The "unbreakable atoms" of matter have been investigated by many research workers and their constitution revealed. The electron microscope has been made possible by the use of the exceedingly minute parts of the atom called electrons which are shot off from the parent atom under suitable conditions. The atom of any element is a combination of smaller particles called protons and electrons. The electron, in which we are most interested at present has the smallest mass of any known particle, only 1/2000 the mass of the hydrogen atom.

The solid state of a metal consists of atoms in a definite arrangement called crystals. The space between the atoms is not empty, but

contains many free electrons moving about at random much like the atoms in a gas. The moving electron, under the usual conditions, does not possess sufficient energy of itself to break through the outer wall of the metal.

When was the electron born? Much labor has been expended in its discovery.

Benjamin Franklin (1756) thought of "electric matter consisting of particles extremely subtle since it can penetrate common matter, even the densest with such freedom and ease as not to receive any appreciable resistance."

Michael Faraday (1833) observed in electrolysis the same quantity of electricity was associated with the atom of hydrogen as the atom of silver.

Crookes (1879) considered the cathode rays to consist of flying swarms of charged particles producing impact effects and being deflected by a magnet; "little indivisible particles supposed to constitute the physical basis of the universe."

Edison (1833) observed a flow of electricity across the vacuum of his electric lamp from the heated filament to a positively charged plate sealed within the glass bulb of the lamp. This is the fundamental physical principle underlying the operation of almost every type of electron tube in use today, including the electron microscope. Edison, however, did not make use of this principle.

Stoney (1891) introduced the word "electron" to designate the elementary electric charge. Thompson, Lenard, Zeeman and a great many others experimented about this time and the electron theory of matter became generally accepted.

The application of an electric motive force (connect the metal wire to an electric battery) causes the free lectrons within the metal crystal to move at high speed through the metal wire producing the flow of electricity with all its remarkable heating and magnetic effects. In a partial vacuum the metal filament becomes heated to incandescence and many of the free electrons, at this temperature, attain sufficient energy to break through the outer wall of the metal crystal and enter the partial vacuum surrounding the heated filament. This phenomenon is referred to as the thermionic emission of electrons and takes place in every electron tube such as used in your radio receiver.

The electron having the smallest mass of any known particle and carrying a minute charge of electricity is easily moved once it has

freed itself from the metal and moved out into the partial vacuum. It has been observed that a magntic field has the same effect upon a beam of electrons as the optical lens has upon a light ray. A new subject has been developed known as Electron Optics to deal with these problems.

Electron optics has a very close analogy to the optics of light.

1. The motion of the electron takes place in a straight line.

2. Electron refraction occurs when the electron passes to a second region where the velocity changes.

3. The amount of refraction depends upon its speed.

4. A definite wave length is associated with the electron.

The wave length associated with the moving electron varies with the applied voltage according to the equation:

$$\lambda = \sqrt{\frac{150}{V}} \text{ Angstrom units}$$

where

λ = wave length
V = voltage
1 Angstrom unit = .00000001 centimeters

Electrons moving with a velocity corresponding to 60,000 volts will have a wave length of .05 Angstrom. Compared with the wave length of ordinary visible light of 4000 to 7000 Angstroms we are now dealing with a source whose wave length is about 1/100000 that of visible light.

So far we have been considering the electrons, perhaps we had better consider for a moment the microscope. The optical microscope with which you are all familiar has performed miracles, but it also has a limit to its magnification. This limit is due to phenomenon of light rays known as diffraction. Light passing through a narrow slit, two portions of an object close together, does not give sharp images, but a series of light and dark bands to either side of the center line. This causes an overlapping of the images making it impossible to distinguish detail. We refer to this as the resolving power of a microscope; the ability to show minute detail by separating two portions of an object very close together.

Two objects may be resolved if the distance (d) between them is not less than a certain amount given by the formula.

$$d = \frac{\lambda}{2\,\mu \sin \alpha}$$

where

λ = wave length of the radiation

and

μ = index of refraction of the medium

α = ½ angular aperture

The distance (d) may therefore be made smaller and the magnification increased by:

(a) Use of ultra-violet light because the wave length is shorter than visible light.

(b) Use of an immersion fluid whose index of refraction is greater than that of air.

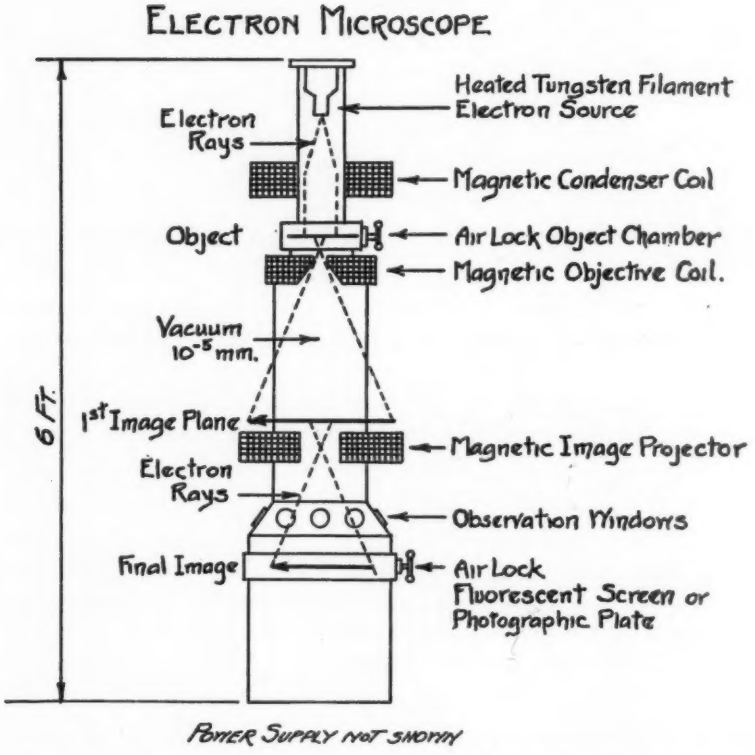
(c) Or by the use of the electron rays we have just considered because the wave length of these rays is only 1/10000 that of visible light.

This latter fact makes possible the greater resolution and therefore greater magnification obtained by the electron microscope.

The electron microscope embodies all of these principles. The electrically heated filament ejects a beam of minute electrons which passes through a number of magetic fields which causes a deflection of the electron beam in the same way that the optical lens acts upon a light ray. In such a magnetic field the electron moves in a helix down the tube. The magnetic field causes a rotation of the principal plane of the electron motion. Electrons starting from an object in one plane will arrive at the image in one plane.

Change in magnification is made in the electron microscope by simply changing the current through the magnetic coils. The image produced on the fluorescent screen is visible at all time. When the desired magnification is obtained the photographic plate may be substituted for the screen and a picture obtained in a few minutes.

The entire path of the electrons must take place in a high vacuum and several ingenious features have been included in the R. C. A. electron microscope to make possible the rapid change of the object and photographic plate without destroying the vacuum in the entire microscope. The ordinary air at a pressure of 76 centimeters of mercury contains about 10^{19} molecules per cubic centimeter. The very best vacuum attainable, used in the electron microscope still has



10^{10} molecules per cubic centimeter, but such density of air does not prevent the movement of the electrons.

The object chamber and the chamber containing the photographic plate act like air locks and may be sealed off from the main tube before opening. It is therefore only necessary to reduce the small volume of this chamber to the desired pressure after inserting the specimen to be photographed.

The material to be examined may be placed upon a cellulose film spread on water and supported by a very fine mesh wire. This is necessary since the electrons would not pass through the ordinary glass microscope slide. The specimen, supported in this manner, is inserted into the air lock, which is closed, and by means of horizontal adjustment any portion of the specimen may be examined. Magnification is accomplished by changing the strength of the magnetic fields not by changing the lens as in the ordinary optical microscope.

This new tool will undoubtedly bring to attention many phenomena connected with the behavior of bacteria in producing disease. In industry the electron microscope will make possible the examination of fibers, pigments, crystal structure and may eventually make possible the observation of the molecules themselves.

MEDICAL CARE IN THE AVERAGE FAMILY

In a recent release by the Federal Works Agency of the Works Projects Administration the results of a survey as to the medical expenditures of average families is of interest. Working in cooperation with the U. S. Department of Agriculture the following conclusions were reached:

Families living on farms, in villages and small cities spend approximately 5 per cent. of their annual income for medical care. Expenditures of farm families are smaller than those of small city and village families with comparable incomes.

Low-income families tend to economize on dental care but even at the upper end of the income distribution where presumably families could afford routine dental examinations expenditures for this purpose were by no means universal.

Medicines and drugs were widely resorted to in lieu of attendance by a physician or other special practitioner, particularly in the low-income groups. That most of them wanted medical service as well but were hesitant about spending the money was indicated by the marked decline in the proportionate number of families so limiting their expenditures when incomes increased.

Services of physicians, surgeons, and other practitioners, dentists, oculists, nurses and clinic visits accounted for seven-tenths of the total medical bill of all families studied. Medicines, drugs, eyeglasses and other medical supplies made up approximately 15-25 per cent. Health and accident insurance took almost 10 per cent. in most city and village units with a smaller proportion in the majority of farm sections.

NO WORMS IN MINE, PLEASE

By T. Swann Harding

A CERTAIN New York newspaper which entered the field only a few months ago has been publishing digests of reports from Government agencies that deal with misbranding, adulteration, and false and fraudulent labeling and advertising of foods, drugs, cosmetics, and so on. It would be unethical to name this newspaper though it may be said that it carries no advertising and that its name is composed of the sixteenth and the thirteenth letters of the alphabet in close juxtaposition.

In the course of their activities the Food and Drug Administration of the Federal Security Agency and the Federal Trade Commission, which is on its own, make public some pretty disheartening things about some rather prominent manufacturers and advertisers. Products, labels, and advertising turn out to be extremely objectionable at times. The public gains, to be sure, but some apparently corn-infested toes are trod down painfully. Squawks result.

Thus a short while back the outraged vice-president of one of the large manufacturing firms of the country, who shall be nameless here, wrote in a tear-drenched, grief-stricken letter which the newspaper obligingly published. He suggested that the editors "hold steam" in publishing complaints from Government agencies which seek to defend consumers. While the Government habitually used "awfully strong words" like "putrid, decomposed, false, fraudulent, poisonous, immediately dangerous to health, and the like," the only thing usually involved was "some minor infraction of a bureaucratic rule."

While "consumer(?)" publications ranted and raved to high heaven about such trivia, a responsible newspaper should not "descend

---

This Journal has on occasion taken exception to the overzealous action of certain government agencies but let it not be assumed we are partial in our viewpoint. The following article is of interest from the consumer standpoint and it is herewith presented.—Ed.

to that level." In short it should find out that real fraud existed before it cried fraud. "Certainly butter is butter, whether it contains 79.9 per cent. butterfat or the arbitrary 80 per cent. required by law, and the inspector who found only 79.9 per cent. butter fat conceivably might have erred just a little." So quit printing such stuff because "real frauds are almost impossible today among responsible manufacturers."

That letter seemed to bear a bit of looking into. So the writer got his looker out, read the old and the new laws enforced by the Food and Drug Administration, since the indictment seemed to bear upon it, and then rambled through several hundred notices of judgment issued by that Administration during the past few months. These notices are digests of what was done in cases the Government brought against manufacturers for adulteration, misbranding, or falsely or fraudulently labeling their foods, drugs, and cosmetics.

It immediately became apparent that certainly some of the largest, most respectable, and therefore it is assumed most responsible manufacturers were concerned in these cases. It would not be quite fair to name them as, on occasion, a specific offense was unavoidable. On the other hand real fraud also cropped up among them and it was cretainly comforting to this consumer to know that the market had been rid of their products.

Secondly, it was apparent that minor infractions of bureaucratic rules was an understatement. Not the rules but the laws themselves were violated. Thus Section 7 of the Food and Drug Act passed June 30, 1906, held that a food was adulterated: "If it consists in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, or any portion of an animal unfit for food, whether manufactured or not, or if it is the product of a diseased animal, or one that died otherwise than by slaughter."

Section 402 of the Food, Drug, and Cosmetic Act which went in force in 1940 is stronger and holds a food violative: "If it consists in whole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food; or if it has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or where it may have been rendered injurious to health; or if it is, in whole or in part, the product of a diseased animal or of an animal that has died otherwise than by slaughter; or if its

container is composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health."

That, kind Christian friends, is the law. Let us now glance at the facts as embalmed for eternal scrutiny in the notices of judgment. We must at the same time have due respect for the taste of the vice-president quoted above. This is still a democracy, thank the Lord, and it is not only his right to eat filthy, putrid, or decomposed substances, but he can also roar to high heaven because an impertinent Federal Government agency, doing the will of the people as registered in Congress, removes such succulent and palatable foods from the market, thus depriving him of them.

But tastes differ. This is a day of microscopes and accurate bacteriological tests. When these show, as they did in the case of some Atlanta butter three or four years ago, that the product is full of dismembered insects and their excreta, this writer for one would prefer to pass up the butter. He agrees with Judge Underwood who, in this case, told the local Food and Drug Station Chief that he considered the offense all the more reprehensible because the purchaser could not detect the filth with his naked eye—or shall we say insect remnants and excreta are filth?

Certainly ordinary butters as well as peanut butters that are contaminated with sand, dirt, excreta, rodent hairs and their pellets are filthy as far as I am concerned. I am perfectly content to have the Food and Drug Administration deprive me of my inalienable right to consume such stuff. I feel the same way about Limburger cheese the rind or skin of which was found impregnated with animal matter, flies, hair, and other substances of animal origin which in some cases penetrated to the interior. I side with District Judge O'Brien, who said, April 18, 1939, that manufacturers should protect consumers from such contaminants. The Judge continued:

"Whether such cheese would be injurious to health or not is not of moment, or the court doesn't know, but at least the ultimate consumer in the homes and in the hotels and restaurants has a right to assume that the product that he eats or orders is free from such conditions. Otherwise, besides the annoyance that might ordinarily accompany the consumption of Limburger cheese, they would also have to provide themselves with microscopes or magnifying glasses.

In fact, in the future, restaurants might advertise 'With music and magnifying glasses.' " Incidentally an extremely well-known and responsible manufacturer was concerned here.

Regardless of what industrial vice-presidents may say, I do not like my egg noodles, corn meal, and flour contaminated with beetles, other insects and their larvæ, and pellets of excreta. Perhaps my stomach is easily turned and I am overdiscriminating, but that's how I feel. I even relish my tomato juice, catsup, paste, puree and other tomato products better when they are free from fragments of worms and insects and are not made from partly decomposed tomatoes.

I am quite willing to agree that no whole worms or insects were present. That could scarcely be arranged because the product had to be screened in processing. But corn earworms and their excreta are not to my taste, even in fragments. I am glad a Government micro-analyst detected their presence before the stuff reached me. True, there is just no accounting for tastes and the vice-president will doubtless dismiss me as an old prissy. Yet such contaminated tomato products are filthy to me.

I feel the same way about maggot-contaminated huckleberries and blueberries, and about candy made under filthy conditions and adulterated with rodent hairs, insect larvæ, insect skin, and human hairs. I have what amounts to an aversion for crab meat high in *B. coli* count, because it was carried in baskets containing worms and human excrement. Regardless of the feeling among our best vice-presidents, I have no relish at all for tullibees infested with parasitic worms. They may not impair the taste of the food for big industrialists but, as the judge said, "an ordinary person would have a strong aversion against eating such fish", not to mention the decomposed broken-down fish tissue packed therein as a garnish.

Ideas about what constitutes filthy, putrid, and decomposing apparently differ widely, but such things are, for all of me, revolting, and the hell with them. I am even so constituted that I would not knowingly treat my sores or ulcers with a product composed of animal fat and the excrement of pigs. As far as I am concerned that product is both filthy and fraudulent. It could menace health and rob the pocketbook at the same time.

In the same way, while I should hesitate to eat chickens that died of emaciation or that suffered from multiple tumors, or peritonitis, or

septicemia, or extensive bruises, or pneumonia (all recent cases), I should feel I had been defrauded if I bought watered frozen chicken. The weight of such frozen poultry is increased by injecting water under the skin before freezing.

I do not care for deceptive packaging of foods, drugs, and cosmetics, though this has long been carried on extensively by our best and most responsible manufacturers. Very frequently a recess in the bottom of the box makes it appear that one-third more face powder is present than is there, or only from 25 to 30 per cent. of the capacity of the carton or container is actually occupied by the product. That's fraud, as far as I am concerned.

Likewise I should feel defrauded if I bought cod-liver oil which did not contain the vitamins claimed, if I invested in a fake remedy for "that tired feeling," if I purchased Old Man Frantz Mountain Tonic to restore pep, vim, vigor, vitality, and to aid my stomach and stimulate my glands. I do not believe that coal oil sold under a fancy name and a deceptive label will cure varicose veins, sinus trouble, hay fever, exposed cancer, trench mouth, ulcers, and skin diseases. I think all influenza, diabetes, rheumatism, ulcer, tuberculosis, venereal disease, and cancer cures are fakes. I think that "antiseptic" surgical dressing full of dangerous germs should be confiscated.

False and fraudulent scarcely seem adjectives too strong to use with regard to such products. In the same way there is plenty of reason for the Government to invoke expressions like poisonous or imminently dangerous to health to describe other products of responsible manufacturers acted against recently. Painkillers, headache remedies, obesity remedies, and laxatives containing acetanilid, sodium or potassium bromide, aspirin, caffeine, cinchophen, phenacetin, aminopyrine, and phenolphthalein are plenty poisonous and/or dangerous to health when used as prominent, nationally known, and supposedly responsible manufacturers have long advised in print. Thyroid, sulphanilomide and dinitrophenol are extremely dangerous drugs, all have been used in patent medicines, and I am plenty glad the Government protects me from them.

Such powerful agencies as thallium acetate, alkaline sulphides, paraphenylenediamine, mercury salts, silver nitrate, pyrogallol, salts of cadmium and selenium, nitric and acetic acids, and corrosive sublimate are used in depilatories, hair dyes, eyelash and eyebrow dyes,

skin cleansers, lipsticks, freckle removers, mole and blemish "cures," and so on, and it is very fortunate that the lady publics are protected from such drugs. They are poisonous and also imminently dangerous to health, yet the best manufacturers have to be stopped from using them in products recommended as harmless to use freely.

Come right down to that, arsenic or lead spray residues in fresh fruits and vegetables are poisonous and imminently dangerous to health. Such salts were first used by French grape growers to protect their fruits from robbers, and their intent was certainly not to build up the health of those who stole the grapes. It is extremely fortunate that the Government has established tolerances for such residues on fruit and vegetables and affords even vice-presidents protection from them.

To be sure, a vice-president may want to eat poison and to use things imminently dangerous to his health. He may even like his whisky full of aldehydes and wood alcohol. Possibly he thrives on such things. But if sold on the open market they menace the health and lives of what may be called ordinary people. They should be protected. Vice-presidents with perverted tastes can still poison their own fruits, vegetables, and liquor in this our free democracy.

That about reduces us to butter and butterfat before we turn the meeting over to the vice-president. By specific act of Congress butter is defined as consisting of not less than 80 per cent. butterfat, all tolerances having been allowed. Many seizures of butter are made yearly as falling below that standard. Some of the largest, most responsible (we hope) and nationally known manufacturers make this butter. But no seizures are made of butter falling only one-tenth of one per cent. short of the required 80 per cent. Seizures have been made of butter containing only 79.6 per cent. of butterfat down to as little as 78.12 per cent.

If you make butter by the carload there is money in that sort of fraud. In fact, under the old Food and Drugs Act, with its small fines, many manufacturers regularly paid the fines and kept the butterfat low, thus using the penalties as a license to do an illegitimate business. Under the new law with far heavier fines such business is unprofitable. It may be of academic interest to know, however, that if butter is short four-tenths of one per cent. in butterfat it yields about 12 cents additional profit per 100 pounds.

Many big, supposedly responsible manufacturers ship many car- of low-fat butter is $16.80, hence shipments of a carload per week would bring a creamery $876 of illicit profit annually. If the butter contained only 79.2 per cent. butterfat the profit would run up to $1,752 per year. It is easy to see how much water the housewife would soon be purchasing at butter prices if we permitted vice-presidents to regulate such little things. Not only that, but much butter has been seized because packaged in containers that looked as if they held a pound but which held actually eight ounces or less!

While we are on this subject it is of interest to observe that butter makers know their own good better than do vice-presidents. Creamery associations have sent around letters telling their members to guard against short weight, low butterfat, and also the kind of filth and dirt that can only be detected microscopically. They have warned members that Government tests are accurate and that a Federal bacteriologist can tell when decomposed cream was used to make butter. These letters suggest strict conformity with the law as a matter of sound policy.

At this point the vice-president may again take charge of the meeting. Insofar as this writer is concerned products have constantly been seized in very recent months that were putrid, decomposed, filthy, falsely or fraudulently labeled or recommended, poisonous, and/or imminently dangerous to health. As far as this writer is personally concerned that is all to the good, and the nameless newspaper of New York performed a public service in printing information about such Government activities. Whatever outraged industrial vice-presidents may think, I am glad to be protected from products which are, to my taste, revolting.

Vice-presidents may eat all the worms and dirt they please. As for me, give me clean victuals.

SELECTED ABSTRACTS

Abstracts of Papers Selected from those Presented before the Scientific Section of the American Pharmaceutical Association at its Annual Convention in Detroit, August 16-23, 1941

A Phytochemical Investigation of Fresh Aloe Vera Leaf. By T. D. Rowe and L. M. Parks. Fresh *Aloe vera* leaf has received considerable attention in the treatment of third-degree X-ray reactions. The above paper presented the result of a phytochemical study of the leaf. The constituents of both pulp and rind were investigated. The pulp is about 96.5 per cent. water and it contains about 1 per cent. cellulose, an oxidase and catalase enzyme, calcium oxalate a gum precipitated by alcohol, but no tannin nor appreciable nitrogenous matter. The pH of the pulp was found to be about 4.7 and interesting was the absence of aloin in the fresh material. Aloin, however, is developed on drying the pulp. That vitamin D was not concerned in its healing action was established since this vitamin was entirely absent.

Further Studies on the Use of Aloe Vera Leaf in the Treatment of Third Degree X-ray Reactions. By T. D. Rowe, B. L. Lovell and L. M. Parks. Using fresh *Aloe vera* leaves imported from Jamaica,* a careful study was made to evaluate the curative properties of the plant in X-ray burns. The use of Aloes in burns and wounds actually dates back to 1568 but its use has been greatly stimulated within recent years due to increased therapeutic use of high intensity X-ray treatments and the observation that aloes seemed of value in treating X-ray burns.

White rats were exposed to X-rays to produce experimental burns and the fresh aloes applied to determine its value. Nine times as many animals were cured as were controls in treatments lasting from 2-4 weeks. The deteriorated leaves were also found effective as well as the rind.

The mucilage itself is defintely not the active principle but that some healing principle exists seems definitely established.

*Editor's Note—There are also domestic sources notably in Florida.

Tabasco—A Substitute for Capsicum. By C. R. Olden and E. V. Lynn. About 3 years ago H. W. Youngken reported considerable pungency in domestic Tabasco peppers. The authors utilizing the waste of the Tabasco sauce industry were able using the method of Tice (this Journal *105*, 320 (1933)) to extract as much as 0.4 per cent. capsaicin from such material.

In view of the rather general shortage of Capsicum from abroad it was recommended that Tabasco chillies be considered for official adoption under the monograph for Capsicum. The argument was advanced that the African species possesses no distinct advantage in medicine.

The Solubility of Ephedrine in Liquid Petrolatum. By J. Rosin, G. K. Eger and H. Mack. Ephedrine base is available commercially both as the hemihydrate as well as in anhydrous form. The hemihydrate contains about 5 per cent. of water. Since the primary use of ephedrine base is in the form of a solution in liquid petrolatum, the difference in solubility of these two forms in this solvent is of interest. A surprisingly great difference in solubility was found to exist; for example at 20° C. the anhydrous was soluble to the extent of 2.20 gm./100 cc. whereas the hemihydrate (calculated as anhydrous) was soluble only to the extent of 0.84 gm./100 cc. At 25° C. the anhydrous was soluble to the extent of 3.13 gm./100 cc. and the hemihydrate 1.24 gm./100 cc.

Another observation of interest was that ephedrine was about 10 per cent. less soluble in heavy liquid petrolatum than in the light variety. The melting point of the hemihydrate was higher than that of the anhydrous. From the above observations it would appear that anhydrous ephedrine is the better material for prescription use.

Ultraviolet Absorption of Certain Local Anesthetics. By J. C. Bird. The bluish fluorescence in alcoholic solution observed with certain anesthetics of the benzocaine type led to a closer examination of their absorption spectra using the Spekker apparatus. All compounds derived from *p*-amino benzoic acid were found to show strong absorption characteristics in the band 2500-3200 Å. Various representative esters of *p*-amino benzoic acid such as the ethyl, propyl, etc., showed practically identical phenomena. The steepness of the trans-

mission curves at about 3150 Å indicated a sharp cutoff so that, although practically all light above 3200 Å passes, the transmission immediately below this is nil. Most of the compounds allow a small proportion of light to pass in the region 2300-2500 Å again followed by complete absorption.

Compounds of these bases with benzoic, salicylic and acetylsalicylic acids were prepared and examined. In most cases improved or sharper filter effects in the erythema band were noted. The substances would thus seem to offer practical potentialities as efficient screening materials, a dual advantage being gained by the combination of specific filtration with local anesthetic effect. Actual tests of larocaine salicylate in 1 per cent. simple aquaphilic emulsion gave good results even in tropical sunlight.

Zinc Peroxide and Its Use in Ointments. By R. H. Noel and E. V. Lynn. Considerable variability has attended the use of the zinc peroxide therapy as to the results obtained. This study was instituted to inquire into the reasons for this condition. Zinc peroxide has been particularly recommended for the treatment of lesions infected with anærobic organisms.

After careful study it was concluded that zinc peroxide as a compound probably does not exist and that commercial preparations so labelled as quite likely loose physical or chemical combinations of zinc oxide and hydrogen peroxide. The value of any given sample should first be established by determining the amount of available oxygen by assay.

In using zinc peroxide an aqueous suspension or paste is employed. The commonly observed difficulty of drying out and "caking" may be prevented by the incorporation of Sorbitol or Mannitol. A typical formula which has been quite efficient in treating chronic varicose ulcers in as follows:

Zinc peroxide	40 gm.
Sorbitol	15 gm.
Tragacanth	1 gm.
Ringer's Solution	
To make	100 gm.

In using the above a new dressing should be applied every 24 hours.

Storage Factors and Use of Antoxidants With Oil of Peppermint. By L. H. Baldinger, N. K. Ellis and K. I. Fawcett. Marked changes occur in peppermint oil when improperly stored. In the experiments conducted during this study a variety of containers were employed and conditions of storage as to temperature, completeness of fill, etc., were varied.

Completely filled sealed containers provide the best means of storage. The use of antoxidants was also studied and it was found that they definitely retard the oxidative changes observed in untreated oils. A mixture of hydroquinone and catechol gave best results when tested by experimentally aerating the samples. The use of antoxidants is not, however, recommended for widespread adoption.

The Quantitative Separation of Ergometrine From Other Ergot Alkaloids. By D. C. Grove. A method has been devised which not only separates the ergot alkaloids into the water soluble and water insoluble groups, but also separates the two water soluble alkaloids ergometrine and ergometrinine from each other. The basis of the method is the difference in distribution coefficients of these alkaloids between ether and water. The method in brief consists of taking 25 cc. of the solution of mixed alkaloids in 1 per cent. tartaric acid, making alkaline with ammonia and extracting with 35 cc. of ether. Two other portions of ether are used and then the combined ethereal portion extracted with six 10 cc. portions of acidified water. In this manner the ether soluble alkaloids are extracted from ergometrine. The application of this method when applied to the assay of ergot and its preparations should produce greater agreement between the chemical and biological assay for ergometrine.

Assay Methods for Phenothiazine Pharmaceuticals. By L. E. Harris and E. M. Kerl. There are no published assay methods for the determination of phenothiazine purity or the phenothiazine content of a given preparation. Inasmuch as the use of this substance is increasing as an anthelmintic in veterinary practice, some method of evaluation is important. An extraction method seems to be the best control procedure as long as no other acetone soluble ingredient is present.

In the case of tablets or boluses they are powdered and suitable samples weighed out which represent approximately 1.5 gms. of phenothiazine. This sample is extracted with acetone in a continuous extractor of the A. S. T. M. type for six to eight hours. The acetone is then evaporated, the residue dried at 90° C. and weighed. Care should be exercised during drying to prevent loss by sublimation.

Aqueous suspensions of phenothiazine are usually standardized to contain 12 to 12½ grams per fluidounce. For routine determinations a 10 cc. sample is measured into an ordinary funnel fitted with a fat-free filter paper and a filter cone. The suspension is filtered by aid of gentle suction and the residue washed with distilled water. The residue and filter paper are dried at 90° C. and transferred to the extraction apparatus and the procedure outlined above carried out.

The Determination of Quinine and the Assay of Quinine and Strychnine in Mixtures. By R. L. Herd. A method has been developed for the estimation of quinine based on the titration of a glacial acetic acid solution of this substance with a standard perchloric acid solution prepared in glacial acetic acid and using alpha naphtholbenzein as an indicator. Samples of quinine sulfate, chloride and bromide whose purity was established by a determination of the acid radical were assayed by this procedure and the recoveries were 99.0, 100.2 and 100.0 per cent., respectively.

The separation of quinine and strychnine in mixtures in which the concentration of quinine was 30 to 50 times that of strychnine has been accomplished by extracting the strychnine from a solution of the mixture in 7 N sulfuric acid with a 1 per cent. solution of dichloracetic acid in chloroform.

This procedure when applied to mixtures of the pure alkaloids gave recoveries averaging 97.5 per cent. for strychnine and 99.3 per cent. for quinine. Elixir of iron, quinine and strychnine and certain tablets have likewise been assayed by the application of this technic.

The Influence of Carbohydrates and Salines Upon the Formation of Chloral Alcoholate. By C. C. Pfeiffer and R. T. Lakey. The authors presented a study of the influence of certain sugars as well as salts on the formation of chloral alcoholate when chloral is combined in certain hydroalcoholic liquids. The quantitative relation-

ships involved were discussed and it was pointed out that either sugars or salts may cause the separation of such an immiscible layer.

Of particular interest to the pharmacist was the finding that the chloral alcoholate is no more toxic than chloral itself and that the danger of such combinations lies entirely in the possibility that an overdose of chloral may be taken due to its lying in a supernatant layer.

A Fast Method of Dry, Low Heat Sterilization for Instruments and Appliances. By P. Goedrich and W. Schmidl. The customary methods employed for rapid low heat sterilization of instruments and appliances are rarely satisfactory or efficient. This is particularly true where steam or hot water are employed.

An ingenious method for dry, low heat sterilization was described consisting essentially of a container which could be easily sealed into which the instruments to be sterilized are placed on platforms within the container and paraformaldehyde in the bottom. The container is then placed in water heated to 90° C. and maintained at that temperature for 10 minutes. The container is removed and allowed to cool before being opened. Only traces of paraformaldehyde adhere to the instruments. Such a method was found to kill S. aureus in 10 minutes. Resistant strains which were not killed after 60 minutes steaming were destroyed in this apparatus in 60 minutes at 90° C.

The Action of Some Organo-Metallics on Ringworm Fungi. By R. H. Barry, T. C. Grubb and W. H. Hartung. The fungicidal and fungistatic activity of three organic salts of copper and twelve halogenated aromatic mercurials have been studied. The fungi used were three species commonly associated with ringworm and other diseases of the skin. It was found that copper benzoate is inferior to benzoic acid and copper salicylate inferior to salicylic acid as a fungicide.

In the mercurial group the *p*-fluorophenyl mercuric chloride and the *p*-chlorophenyl mercuric chloride were superior to the corresponding *o*- and *m*- substituted compounds. 2-chlormercuri-6-chlorothymol was more active than the corresponding 2-bromo or the 2-acetoxy mercuri-6-chlorothymol.

The Effect of Ascorbic Acid Intake on Barbiturate Depression in Guinea Pigs. By M. W. Green and R. R. Musulin.

Young guinea pigs were placed upon a diet complete in all respects except vitamin C until their weights became essentially constant. Pure vitamin C was then given by mouth in the form of an aqueous solution in daily doses ranging from 0.25 mg. to 2.5 mg. The animals on each vitamin level were divided into three groups. Group A received pentobarbital in doses of 15 mg./kg. intraperitoneally; group B received phenobarbital in doses of 15 to 50 mg./kg. intraperitoneally and group C, the control group, were given physiological salt solution. The degree of depression in each animal was measured and at the end of the experiment the vitamin C content of the liver and adrenals was evaluated by the familiar indophenol titration. The results of these experiments indicate that (1) barbiturate administration does not cause a depletion of the vitamin from the tissues of the guinea pig, (2) those animals on higher vitamin C levels were progressively less depressed by the barbiturate and the degree of depression varied inversely with the amount of vitamin fed. This latter finding probably indicates that vitamin C plays a role in the detoxification of some of the barbiturates but not in a direct manner.

A New Enteric Coating. By P. V. Maney and R. A. Kuever.

This subject is an almost perennial one but many enteric coatings now in use are far from ideal.

The above authors first attacked the problem by developing an apparatus for testing purposes which was definitely proven reliable by correlating results on it with those obtained by roentgenogram and roentgenoscopic observations.

After considerable study, a coating offering great promise was developed consisting of myristic acid, hydrogenated castor oil, castor oil, cholesterol and sodium taurocholate. The common error of assuming the intestinal tract to be normally slightly alkaline was not made.

Tests of various commercial products presumed to be enteric indicate that many are quite unsatisfactory.

Editor's Note—The new angle of attack by these workers is of interest since (1) They do not assume the intestinal fluid to be consistently alkaline, which has long since been disproved. (2) A coating of material subject to digestive attack *only* in the intestines has been devised.

Pharmacologic Action as Influenced by External Temperature. By K. K. Chen, R. C. Anderson and F. Steldt. Although other work has been done in this field the findings are of definite interest in view of modern practice. The authors used a specially designed laboratory in which the temperature could be varied at will while the humidity remained constant. Various drugs were tested at different temperatures. It was found that phenobarbital and barbital had a longer duration of hypnotic action but a higher toxicity at low temperature than at a high. Aconitine and strychnine were more lethal at a high temperature than at a low. The systolic doses of cymarin and coumingine became smaller as the temperature rose. No convulsive dose of insulin could be determined on mice at low temperature. Diamino-diphenyl sulfone gave remarkable results showing temperature effects. Of particular interest is the increased toxicity of sulfathiazole and sulfapyridine at high temperatures.

A Chemical Study of Isophorone and Some of Its Derivatives. By A. A. Dodge and E. Kremers. Isophorone and isophoronyl alcohol (the latter in both liquid and crystalline forms) were supplied by the Carbide and Carbon Chemicals Corporation. Derivatives of isophorone possessed melting points in agreement with those recorded.

A saturated secondary alcohol in crystalline form was obtained by the hydrogenation of isophorone at room temperature. Its melting point differed from that of any reduction product of isophorone previously reported.

Unsaturated hydrocarbons were secured by the dehydration of both the isophorone reduction product and the liquid isophoronyl alcohol; these differed in physical constants.

The 3,5-dinitrobenzoates yielded by the isophorone reduction product and the two isophoronyl alcohols differed markedly in melting point, suggesting that three distinct compounds are thus represented. Likewise, the molecular weights found by the cryoscope method differed.

SOLID EXTRACTS

Jottings About This and That by the Editor and his Staff

Asphalt, the ancient and honorable! Used in the throne room of Nebuchadnezzar to hold together the bricks of that grand gentleman's abode, this bituminous material is meeting with more favorable notice today than ever before.

With its time-defying, almost indestructible properties ably demonstrated over the centuries, asphalt had, in 1940, its banner year, almost seven million tons being used in this country alone. It is used not only for road building, but for rubber, paper, paint, roofing insulation, waterproofing, damp-proofing and in plastics.

AJP

Well known is the propensity of the English for tea drinking, and it is to be assumed that the armed forces of that nation consume great quantities of the beverage. It is a bit surprising, however, to learn that the By-Products Department of the British Army is faced with the problem of putting to further suitable use 16 tons *of used tea leaves each day. One research worker has brought forth a method that he and some collaborators have developed to rejuvenate the leaves by drying them and adding certain catalysts. The result is a Grade II tea.*

AJP

The recent convention of the American Association for the Advancement of Science came to the conclusion that sex has become less and less dependable during the past decade. That does not mean that women have become more fickle or that men can no longer be trusted, but it does indicate that science's opinions with regard to the sex hormones have undergone marked changes since 1931. Then it was thought that male sex hormones would most certainly bring out male sex characteristics, and that female sex hormones would act accordingly and accentuate woman's charms. Now, later experiments show, certain hormones may react in a manner just opposite to the previously foregone conclusions. Such variation must surely be capable of considerable embarrassment at times.

Once again we trace a product through history, pointing out that silica sand, soda ash and lime have been the basic ingredients in glass ever since the days of the Phoenicians. Luxuries then, glass has been made since that time without interruption and in the quantities commercial demands required. Today, metal shortage is decreasing the production of certain types of containers, and glass manufacture is about to reach an all time high.

AJP

Another problem perplexing British public health officials is that of proper cleansing of air raid shelters to eliminate virulent bacteria in floor dust. Some disease producing organisms persist even after ordinary cleansing. Others appear sporadically, and without definite pattern. Disinfection practices common to hospitals are often ineffective when carried out in these much used shelters. However, it was found that a 40 per cent. preparation of certain phenols destroyed some heavy infections, while treatment of the floors with spindle oil reduces and may entirely eliminate air contamination caused by dust disturbance.

AJP

When gelatin is required for bacteriological use, is that substance derived from bone tissue desirable, or is porkskin gelatin most likely to insure success in the work? Many workers would give little thought to this seemingly minor detail, but a series of experiments established the fact that a porkskin gelatin with a Bloom rating of 250 or higher is best for preparing Nutrient Gelatin. After sterilization for 20 or 30 minutes in an autoclave at 15 pounds pressure, the finished preparation is sterile, solid at room temperature, liquid at body temperature, reactive with known species of bacteria in the usual prescribed manner, and most important, it remains clear when adjusted to the necessary pH.

AJP

A paragraph or so ago we commented on British scientists' problems in the present war. Our country, too, has its problems, one of them being that of obtaining enough properly qualified scientifically trained men and women to carry out the work required by national defense. This is especially true in the Public Health Service. Further information concerning the many positions open may be obtained from first or second class post offices or from the Civil Service Commission in Washington, D. C.

BOOK REVIEWS

Two New Volumes are Critically Analyzed for Our Readers

Drug and Specialty Formulas. By Emil J. Belanger. Chemical Publishing Co., Brooklyn, N. Y., 1941. 307 pages, including index. Price: $6.00.

This work is described by the publishers as a "Selected Collection of Tested Modern Formulas for Medicinal and Vitamin Specialties, Human and Veterinary Remedies," etc. There is also included a digest of the Federal Food, Drug and Cosmetic Act.

Although certain of the technical and cosmetic formulas may be beyond reproach, it is the opinion of this reviewer that the medicinal section is the worst collection of "shot-gun" therapeutics that one could possibly find in a book presumed to be for modern use. One can hardly imagine a new formulary containing a formula described as a "female tonic." The Federal Food, Drug and Cosmetic Act was implemented to act as a barrier to unscientific and dangerous self-medication and yet many of the "modern formulas" herein presented are some of the very products that this Act should protect the public against. The best interests of pharmacy are surely not served by hodge-podge compilations of this sort which serve no useful purpose.

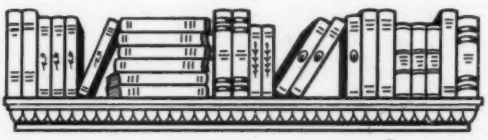
L. F. Tice.

Organic Chemistry. With Applications to Pharmacy and Medicine. By Eldin V. Lynn, Ph. D., Professor of Chemistry, Massachusetts College of Pharmacy. Lea and Febiger, Philadelphia, Pa., 1941. 410 pages. Price: $4.50.

The stated objective of this book is to give an adequate discussion of the important principles of modern organic chemistry and to introduce, as illustrations, those compounds which are used in pharmaceutical and medical practice. In the opinion of the reviewer the author has attained to this objective most creditably.

Under each class of organic compounds there are considered the nomenclature, preparation, properties and reactions of the group, followed by a brief discussion of the more important pharmaceutical and medical compounds. The material may be presented in its entirety in the first course in organic chemistry or, if the class has had previous training in organic chemistry without having considered the pharmaceutical and medical applications, the text may be useful in courses in pharmaceutical organic chemistry such as are given in some schools. For this latter use the book might have included a more complete discussion of the applications. The reviewer commends this fine work to the favorable consideration of teachers of organic chemistry in schools of pharmacy.

ARTHUR OSOL.



OUR CONTRIBUTORS THIS MONTH

T. Swann Harding again this month writes one of his refreshingly different articles. As Scientific Editor of the Department of Agriculture in Washington he has had ample opportunity to observe and read much that undoubtedly makes his writings liberal, thought provoking, and full of fact.

George Rosengarten, Ph. D., is a member of the Department of Physics of the Philadelphia College of Pharmacy and Science. Long a teacher in this field, his clear description of physical principles and their interrelation make his articles both interesting and instructive.

Bernard Witlin, D. Sc., is engaged as a bacteriologist with the United States Public Health Service and is at present stationed in Hawaii. Before his assignment in the government service he was engaged in research centering around the use of chick embryo tissue.